



Cd isotope fractionation in a polluted estuary (The Scheldt): preliminary results from MCICPmass spectrometry on reference material, suspended particulate material and sediments.

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Our study aims to analyse the Cd isotopic composition of sediment and suspended particulate matter samples from the Scheldt estuary (The Netherlands – Belgium) to investigate the possibility to trace fractionation effects related to anthropogenic activities.

Cadmium is a transition metal and is composed of eight stable isotopes ranging from mass 106 to 116. Till now, large Cd fractionations of up to 8 permil/amu have been found for meteorites and lunar soils. In contrast, terrestrial material displays isotopic variations of only 0.3 permil/amu, with the largest variations observed in anthropogenic samples from smelters or metal-rich soils (Cloquet et al., 2005, GGR 29(1): 95-106). These observations suggest that Cd isotopes can be useful in tracing the source of anthropogenic Cd pollution in the environment.

Our chemical procedure includes a wet dissolution of the sample and separation of the Cd fraction on AG-MP1 resin, based on Zn and Cu chemical procedures realized in routine in our laboratory and on the procedure as described in Wombacher et al. (2003, GCA 67(23): 46394654). The Cd fraction is purified through a TruSpec resin. After purification, only 1% Sn is left in the eluted fraction. The total yield is better than 92%. The total procedural blank is inferior to 0.04% of Cd abundances of the samples. The isotopic analyses were performed on a Nu Plasma MC-ICP-MS at ULB.

To validate our methodology, a first series of measurements was done on a Cd solution of the Johnson-Matthey Company (Specpure solution n° 181270710) hereafter JMC-

B. Isotope analyses were realized on several reference materials (Münster Cd, Münster JMC and BAM 1012). A sensitivity of 130V/ppm was obtained in “dry plasma mode”, i.e. using an Aridus desolvating nebulizer for sample introduction. Measurements were performed in dynamic mode combining external normalisation by Ag doping method and sample-standard bracketing method for mass bias corrections (cf. Wombacher et al., 2003). Solutions of 50 ppb Cd and 50 ppb Ag were used. A first run was made to measure Cd and Ag isotopic ratios. Corrections for the isobaric interferences of Sn and In are made in the separate interference run. The use of the Ag external standard to correct instrumental mass bias yielded a significantly better internal precision for the corrected ratios than for the measured uncorrected ratios.

Variations in Cd isotopic compositions are preferentially reported as $\delta^{114/110}\text{Cd}/\text{amu}$. The $\delta^{114/110}\text{Cd}$ obtained for the reference solution JMC-B is 0.01 ± 0.03 permil, based on measurements during several days. Solutions used in other laboratories were measured against our Cd JMCB standard and gave $\delta^{114/110}\text{Cd}/\text{amu}$ values of 0.08 ± 0.1 permil/amu for Münster JMC, $+1.04 \pm 0.07$ permil/amu for Münster Cd and 0.4 ± 0.14 permil/amu for BAM 1012 solution. The measured fractionation between Münster Cd and Münster JMC is consistent with the conclusions of Cloquet et al. (2005). Measurements on sediments from the Scheldt estuary are ongoing and will be discussed.